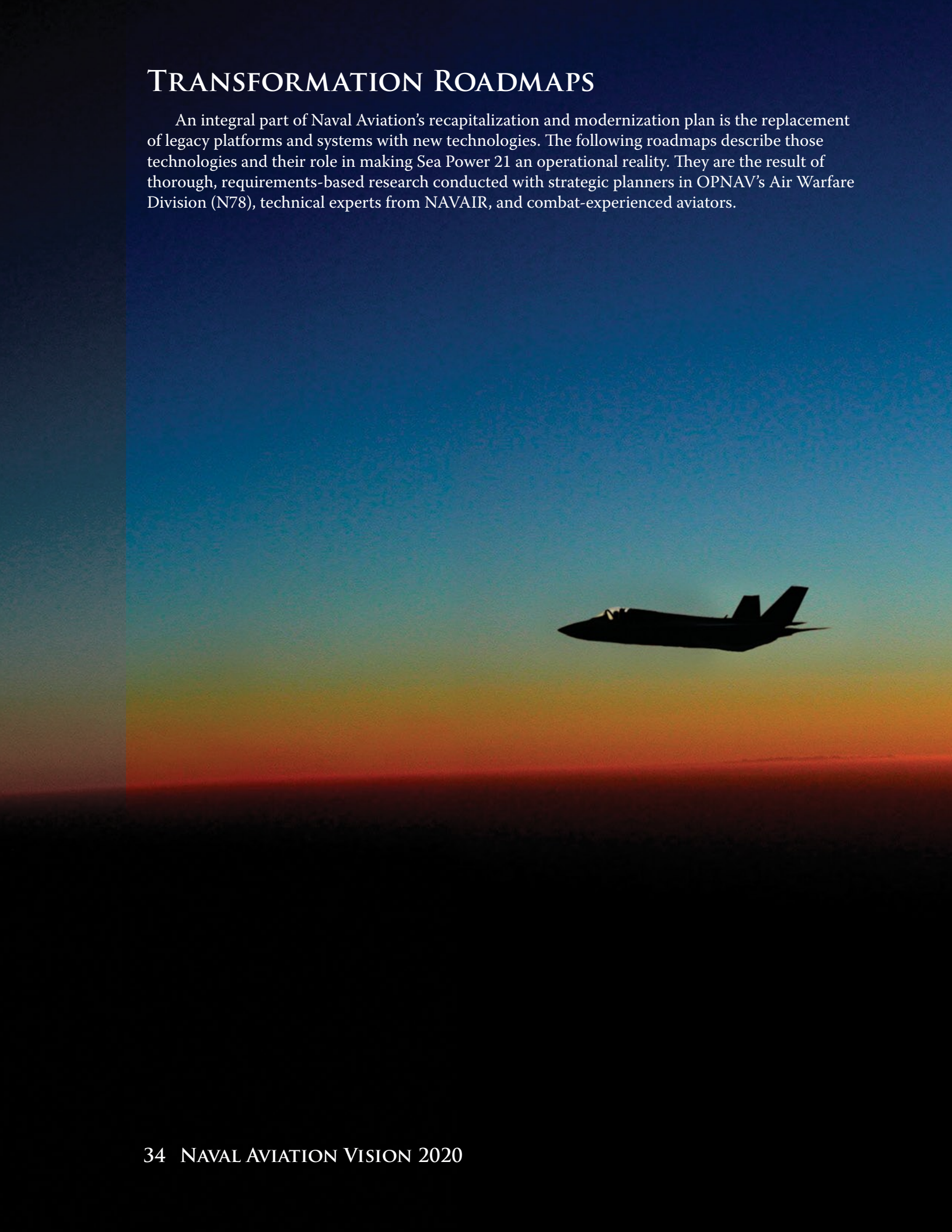
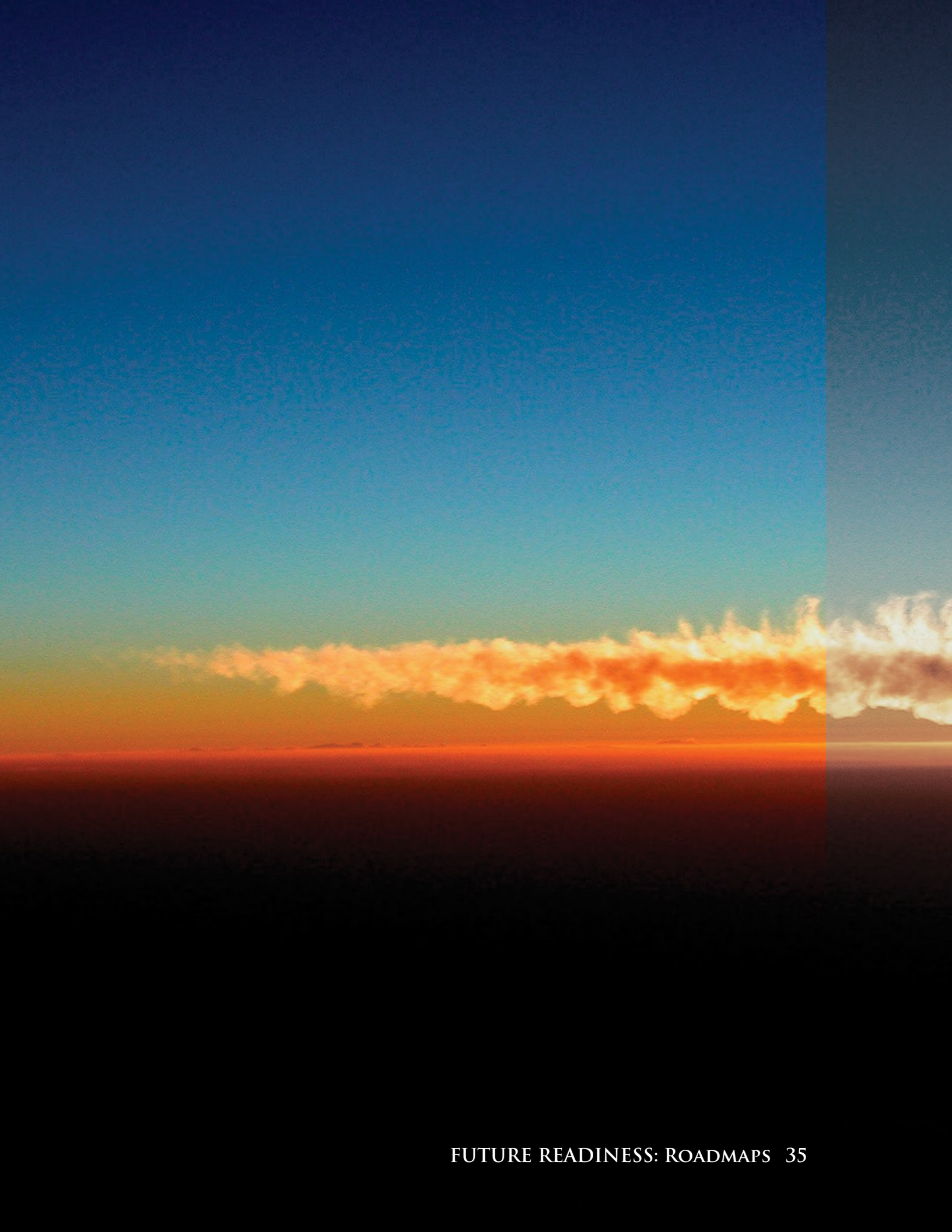
NAVAL AVIATION VISION
2020

Transformation Roadmaps

An integral part of Naval Aviation's recapitalization and modernization plan is the replacement of legacy platforms and systems with new technologies. The following roadmaps describe those technologies and their role in making Sea Power 21 an operational reality. They are the result of thorough, requirements-based research conducted with strategic planners in OPNAV's Air Warfare Division (N78), technical experts from NAVAIR, and combat-experienced aviators.





Aircraft Carrier Roadmap

The aircraft carrier is the cornerstone of Naval Aviation. In the last ten years alone, large-deck carriers have been called upon to respond to, and engage in, over 20 separate international crises, ranging from deterring Iraqi aggression (Operations Northern and Southern Watch) to thwarting attacks on civilians in the former Republic of Yugoslavia (Operation Deliberate Force). In OEF, carrier-based air wings flew strike and combat support missions against Taliban and Al-Qaeda terrorist forces in Afghanistan. In OIF, the carriers operated around-the-clock, immune to hazards such as sandstorms that grounded land-based aircraft. Organic air wings provided strike, electronic attack, airborne early warning, ISR, and other combat capabilities, clearly demonstrating the role of the large-deck aircraft carrier as a permanent fixture in our national defense strategy.

The Navy's fleet of aircraft carriers provides the right balance of forward presence and surge capability needed to wage war in the 21st century. The aircraft carrier projects power across the world's oceans, bringing a versatile, independent striking force to bear against targets that are often hundreds of miles inland. During OEF, carriers in the Arabian Sea launched strikes against terrorist strongholds located deep inside the country of Afghanistan. During OIF, the *USS THEODORE ROOSEVELT* (CVN-71) and *USS HARRY S. TRUMAN* (CVN-75) launched strikes from the eastern Mediterranean Sea against Iraqi targets several hundred miles away. The mobility and self-sustaining operational independence of the carrier provide a unique level of access and on-station persistence that is not dependent on host nation permission or support. Aircraft carriers can remain on-station for months at a time, replenishing ordnance, spares, food, consumables, and aircraft fuel while conducting air strikes and other missions. This capability demonstrates the remarkable operational flexibility and logistical self-reliance of the aircraft carrier, vital to conducting time-critical, "first day of the war" strike operations. The carrier and its strike group are always within reach of being where they need to be, they are ready on arrival, and they bring unequivocal power, presence, and persistence to the fight—independent of land-based supply and support

The current carrier force is largely built around the nuclear-powered *NIMITZ*-class aircraft carrier, of which there are nine presently in service. The last of the *NIMITZ*-class design, *USS GEORGE H.W. BUSH* (CVN-77), is scheduled to enter the Fleet in 2009.

TODAY

NIMITZ-CLASS

Although CVN-77 will have many upgrades and improvements, Service Life Allowances such as weight and center of gravity, electric load margin, aircraft capacity, material handling, and future weapons requirements constrain further growth of the *NIMITZ*-class design. Consequently, a new design is needed to secure the aircraft carrier's role as the centerpiece of the 21st century CSG.

Construction of CVN-78, the lead ship of the *CVN 21*-class, is slated to begin in 2008. The *CVN 21*-class will be the first major design upgrade since 1961, when the nuclear-powered aircraft carrier, *USS ENTERPRISE* (CVN-65), was commissioned. The *CVN 21*-class will boast an improved reactor design and all of the auxiliary systems outside the main propulsion plant will be electrical, eliminating steam/hydraulic and pneumatic piping and reducing lifecycle costs. The improved reactor and zonal electric distribution system will increase electric power generation capacity by 300 percent, enabling new technologies like the Electro-Magnetic Aircraft Launch System (EMALS), and powering advanced command and control systems. The new design will also include an advanced arresting gear system, a redesigned hull, and a more efficient flight deck, reducing manpower requirements by 30 percent. The flight deck will be more flexible with regard to aircraft turnaround and launch and recovery cycles, increasing the numbers of sorties flown per day. The *CVN 21*-class will restore growth and electrical margins no longer available in the 40-year-old *NIMITZ* design, complementing Naval Aviation's transformation. When compared to *NIMITZ*-class carriers, the total operating cost savings are estimated to be over $7.1B per ship.

To meet the demands of 21st century warfare, the *CVN 21*-class will deploy long-range manned and unmanned strike aircraft. Advanced weapons and long-dwell sensors, combined with high-speed sealift, tilt-rotor aircraft, and advanced amphibious assault vehicles, will generate more flexible combat power. Joint Concepts of Operation, centered on the *CVN 21*-class, will leverage the military strengths of our Joint Services, bringing cooperative muscle to the fight and a potent synergy across the warfare continuum.

The design approach and spiral development of the *CVN 21*-class will reduce risk by introducing new technologies and capability at an affordable pace. Armed with aircraft such as the F/A-18 E/F *Super Hornet*, F-35C *Joint Strike Fighter*, and Unmanned Combat Air Vehicles, the *CVN 21*-class aircraft carrier will project dominant maritime combat power well into the foreseeable future.

2020

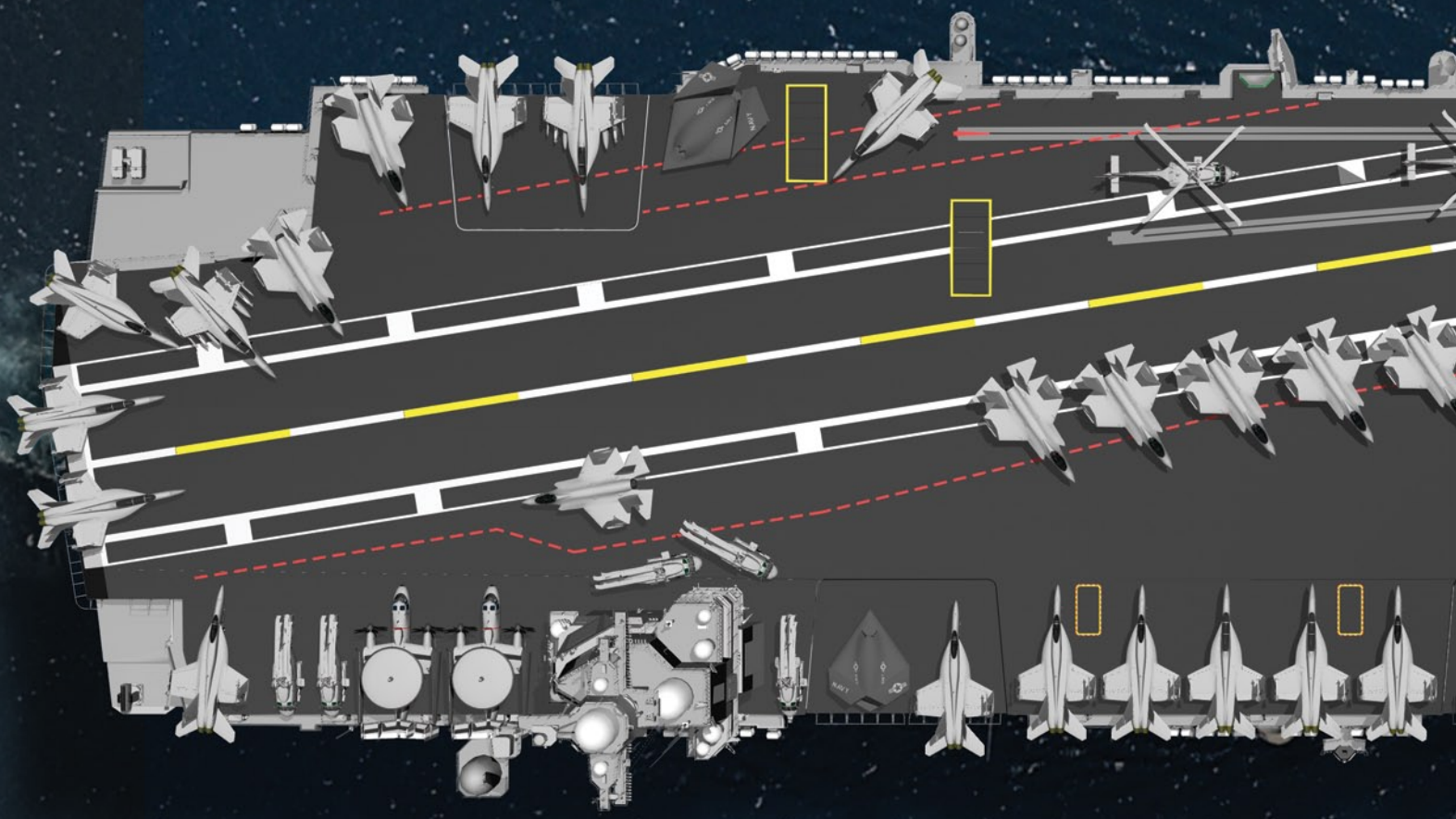
CVN 21-CLASS

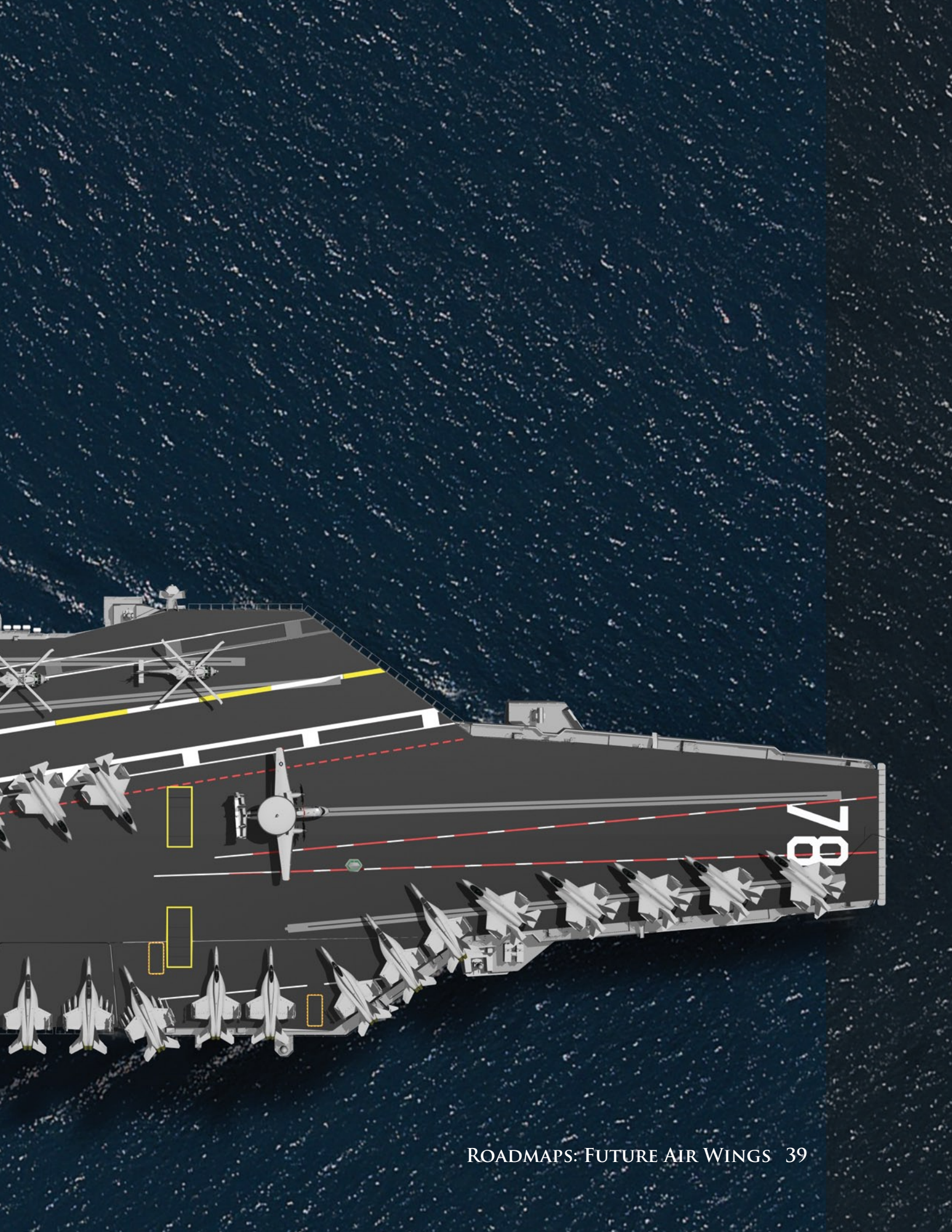
Future Carrier Air Wings (CVWs)

The notional CVW of the future is as follows:

- 44 Strike Fighter (F/A-18, JSF) aircraft
- 4 – 12 Joint-Unmanned Combat Air System (J-UCAS) aircraft
- 5 EA-18G Airborne Electronic Attack (AEA) aircraft
- 5 E-2D *Advanced Hawkeye* aircraft
- 20 MH-60R/S helicopters (at least 6 will be operated from CSG cruisers, destroyers, and Combat Logistics Force (CLF) ships)

Additionally, two Carrier Onboard Delivery (COD) aircraft will support the air wing and CSG.

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F-35B/C *Joint Strike Fighter*

The *Joint Strike Fighter* (JSF) Program will develop and field a tri-service family of next-generation strike fighter aircraft, emphasizing affordability and survivability.

Marine Corps AV-8B and F/A-18A/C/D aircraft will be replaced with the F-35B Short TakeOff/Vertical Landing (STOVL) variant of the *Joint Strike Fighter*. STOVL JSF combines *Hornet* multi-role functionality with *Harrier* basing flexibility, providing the Marine Corps with a low-signature, state-of-the-art aircraft armed with "leap-ahead technology." Initial Operational Capability (IOC) for the F-35B is FY 2012.

The Navy's F-35C will complement the *Super Hornet* thanks to the JSF's all-aspect stealth strike design and 700 nautical mile radius of action (unrefueled). The JSF will enhance the flexibility, power projection, and strike capability of the CVW and the Joint Task Force (JTF). IOC for the F-35C is FY 2013.

F/A-18E/F *Super Hornet* Strike Fighter

There are a number of enhancements to the F/A-18E/F *Super Hornet* that will sustain its lethality well into the 21st century. Upgrades include critical growth capability, enhanced survivability, and weapon bring-back improvement. Avionics upgrades include the APG-79 Active Electronically Scanned Array (AESA) radar system, the Advanced Targeting Forward-Looking InfraRed (ATFLIR), and the SHAred Reconnaissance Pod (SHARP) system. Future avionics upgrades will enable network-centric operations, enhancing situational awareness and the transfer of sensor data to remote command and control nodes. The *Super Hornet* will also assume the organic tanking mission vacated by the departure of the intrepid S-3B *Viking*.

EA-6B *Prowler*/EA-18G Airborne Electronic Attack/ USMC Joint EA Solution

The EA-6B *Prowler* has long served as the nation's foremost tactical electronic attack platform. In December 2001, the Navy completed an analysis of alternatives for Airborne Electronic Attack, laying the foundation to replace the *Prowler* with the EA-18G. Until then, investments in the ALQ-218 receiver system, which is the heart of the EA-6B Improved Capability III (ICAP III) program, will provide a critical technology bridge between the *Prowler* and the EA-18G. ICAP III and EA-18G are vital components of the Defense Department's plan to build a Joint "system-of-systems" electronic attack capability. IOC for the EA-18G is FY 2009.

The Marine Corps' Airborne Electronic Attack replacement aircraft has not yet been determined. Current plans have the Marines flying the EA-6B *Prowler* until 2015.


TODAY
2020
AV-8B
F-35B
F/A-18A/B/C/D
F-35C
F/A-18E/F
F/A-18E
F-14B/D
F/A-18F
S-3B
EA-6B
EA-18G

Joint-Unmanned Combat Air System (J-UCAS)

Naval Aviation is planning the development of a carrier-based, multi-mission Unmanned Combat Air Vehicle known as the Joint-Unmanned Combat Air System (J-UCAS). Equipped with intelligent autonomy technology, J-UCAS will require minimal operator intervention, normally for such things as mission planning inputs, updates, and target selection/weapons release approval. J-UCAS can be used for a wide variety of missions, including surveillance, reconnaissance, strike, and Suppression of Enemy Air Defenses (SEAD).

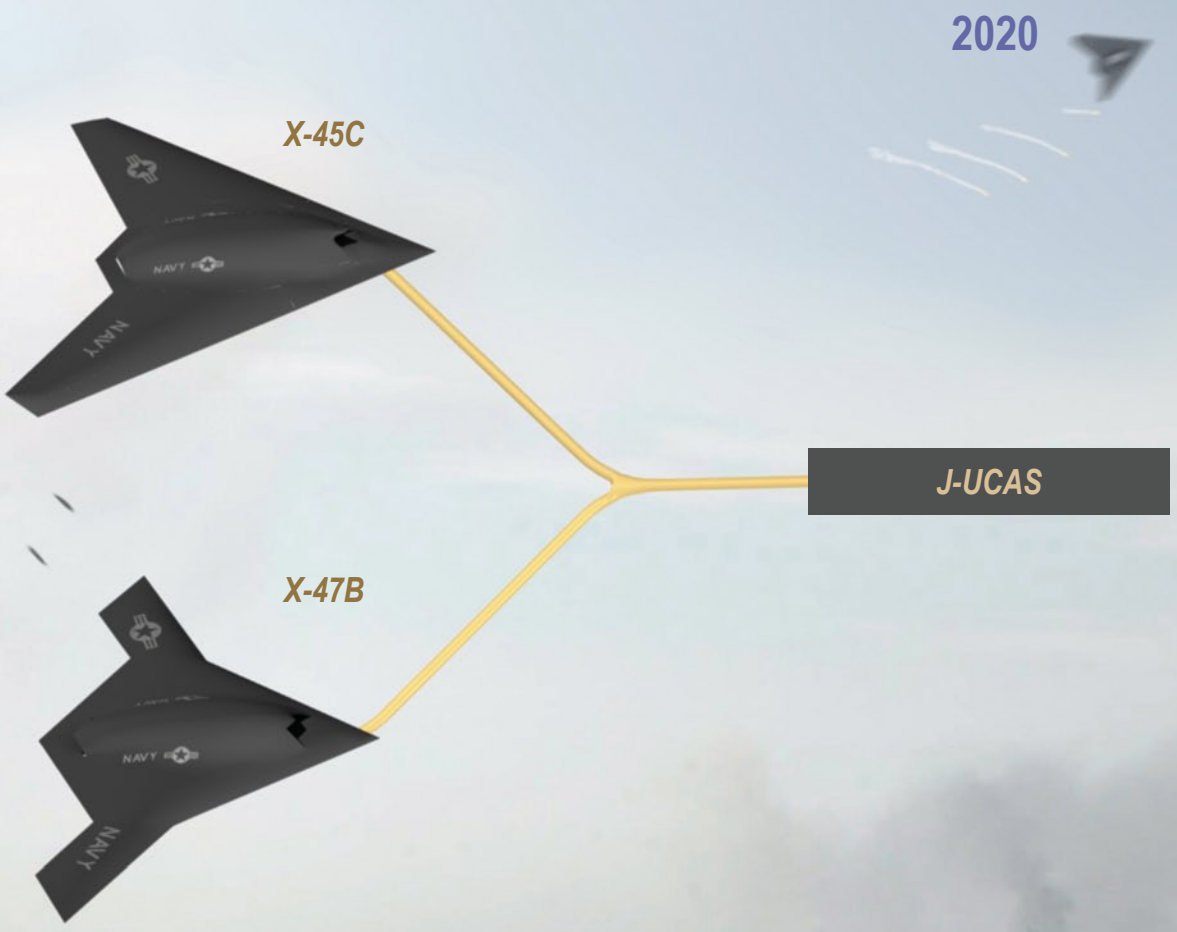
The program office is pursuing the design of two airframes, X-45C and X-47B, and detailed planning is now underway for a demonstration phase and follow-on operational assessment. Along with the goal of demonstrating a carrier-based multi-mission Unmanned Combat Air Vehicle (UCAV), the current program intends to develop a Joint C^4ISR and command and control architecture for the family of J-UCAS vehicles.

The J-UCAS surveillance variant has an expected IOC of FY 2015. The Strike/SEAD variant has an expected IOC of FY 2020.

Pioneer Unmanned Aerial Vehicle (UAV)

The *Pioneer* UAV System is a key asset for the Marine Corps. It provides near real-time ISR, including video imagery for artillery, air fires, and BDA over land and sea. Both the Navy and Marine Corps first deployed *Pioneer* in 1986.

The *Pioneer* Program sustains *Pioneer* and ensures its viability for the Marine Corps until a follow-on system is procured. The program will develop changes to the Ground Control Station, Launch and Recovery System, payload, and Air Vehicle (payloads, engine, avionics).



Eagle Eye UAV

The *Eagle Eye* UAV System is a tactical Vertical TakeOff and Landing (VTOL) ISR asset that is currently being developed by the United States Coast Guard in connection with its Integrated Deepwater System.

The Marine Corps views *Eagle Eye* as the best, near term UAV solution until a future Vertical Takeoff and Landing UAV (VUAV) is developed. *Eagle Eye* combines speed and endurance with a vertical takeoff and land capability that supports Expeditionary Maneuver Warfare.

Eagle Eye will fill capabilities gaps between *Pioneer's* sundown and the introduction of a future VUAV system. IOC is planned for FY 2009.

AH-1Z *Super Cobra* and UH-1Y *Huey* Helicopters

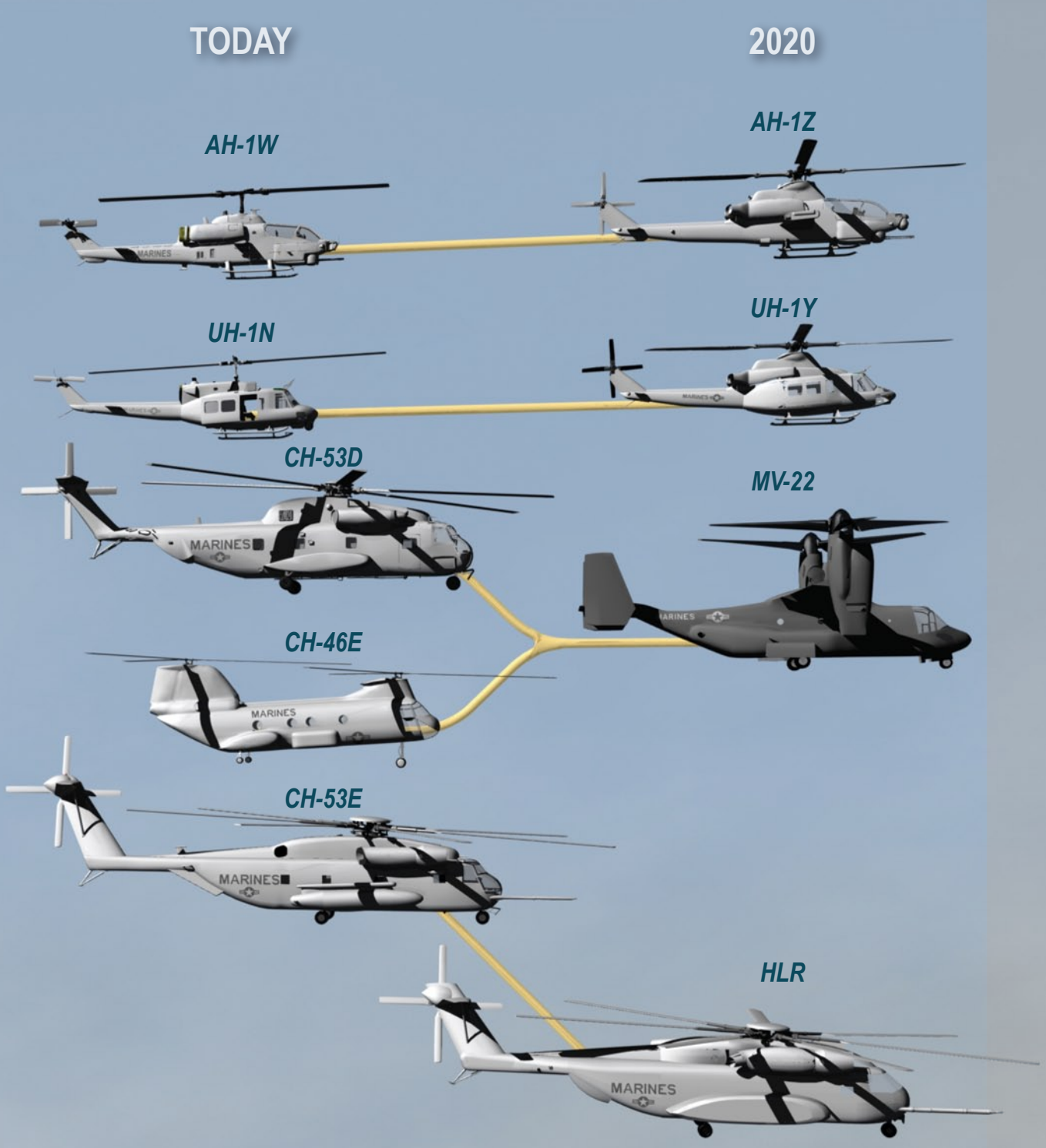
The H-1 upgrade program converts 180 AH-1W *Super Cobra* helicopters to the AH-1Z and buys 100 new-production UH-1Y *Huey* helicopters. Both aircraft feature the latest technology in rotor and drive train design, avionics, sensors, and weapons. They also share approximately 84 percent of their parts, making them far more maintainable, supportable, survivable, and deployable than current generation H-1 aircraft. IOC for the AH-1Z is FY 2011. IOC for the UH-1Y is FY 2008.

MV-22 *Osprey* Tilt Rotor

The MV-22 *Osprey* is a tilt-rotor Vertical/Short TakeOff and Landing (V/STOL) aircraft designed as the medium-lift replacement for the Vietnam-era CH-46E and CH-53D helicopters. The *Osprey* can operate as a helicopter or turboprop aircraft and incorporates advances in composite materials, airfoil design, fly-by-wire controls, and digital avionics. It possesses twice the speed, five times the range, and three times the payload of the CH-46, and will revolutionize 21st century expeditionary warfare. IOC for the MV-22 is FY 2007.

Heavy Lift Replacement (HLR) Helicopter

In operation since the early 1980s, CH-53E helicopters are now starting to reach their airframe fatigue life service limits. To keep the Fleet Marine Forces operationally effective through the 2025 timeframe, the Marine Corps is preparing to develop aircraft in the Heavy Lift Replacement (HLR) Helicopter configuration. Formerly known as the CH-53X, HLR has the expeditionary heavy-lift capability to meet the Marine Corps' specialized and unique requirements. HLR will feature high-efficiency rotor blades with swept cathedral tips, a common engine system, survivability enhancements, a Joint interoperable modern cockpit, a low-maintenance elastomeric rotor head, and an improved structure and drive train. The HLR program will improve operational capabilities and reduce life-cycle costs through operations and support cost reductions, increased range and payload, commonality with other assault support platforms, and digital connectivity and interoperability.


TODAY
2020
AH-1W
AH-1Z
UH-1N
UH-1Y
CH-53D
MV-22
CH-46E
CH-53E
HLR
MARINES

E-6B *Mercury* Airborne Command Post

Derived from Boeing's 707 aircraft, the E-6B supports Sea Strike Strategic Deterrence. It provides the Commander, U.S. Strategic Command (USSTRATCOM) with the command, control, and communications capability needed to direct and employ strategic forces. Designed to support a flexible nuclear deterrent posture well into the 21st century, the E-6B performs Very Low Frequency (VLF) emergency communications, STRATCOM Airborne Command Post missions, and Airborne Launch Control of ground-based Inter-Continental Ballistic Missiles (ICBMs). It is the Navy's only survivable means of nuclear command and control.

The Block I modification program will improve capabilities and resolve deficiencies identified by STRATCOM. IOC is planned for FY 2010.

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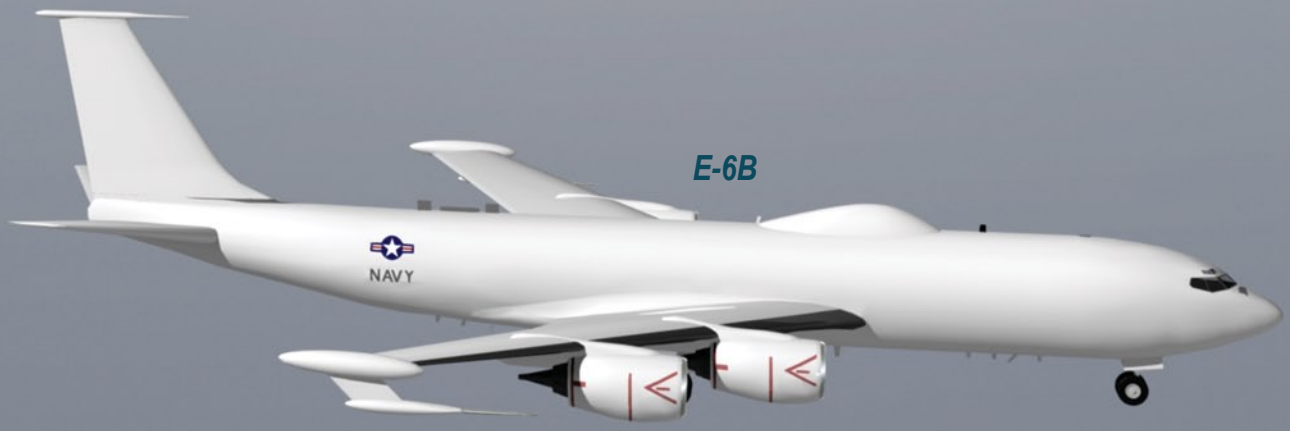

E-6B

TODAY

VXX Presidential Helicopter Replacement

Lockheed Martin's "U.S. 101" is in development as the replacement for the 20-year-old VH-60N and 30-year-old VH-3D helicopters, currently providing transportation for the President and Vice President of the United States, foreign heads of state, and others as directed by the White House Military Office. The U.S. 101 will have a hardened, mobile, command and control/transportation capability, and a system of integrated systems necessary to meet current and future presidential transport mission requirements. Performance, reliability, and systems technology will all be improved with the U.S. 101. IOC for the U.S. 101 is FY 2010.

2020

VXX